

# THE CHROMOSOME COMPLEMENTS OF ALLIUM STELLATUM AND NOTHOSCORDUM BIVALVE

EDGAR ANDERSON

*Geneticist to the Missouri Botanical Garden*  
*Associate Professor of Botany in the Henry Shaw School of Botany of*  
*Washington University*

*Allium stellatum* Ker. is very common on dry, rocky banks from Illinois and Missouri westward. It bears large upright umbels of bright rose-pink flowers in late autumn and has six conspicuous crests on the ovary which persist in the fruit.

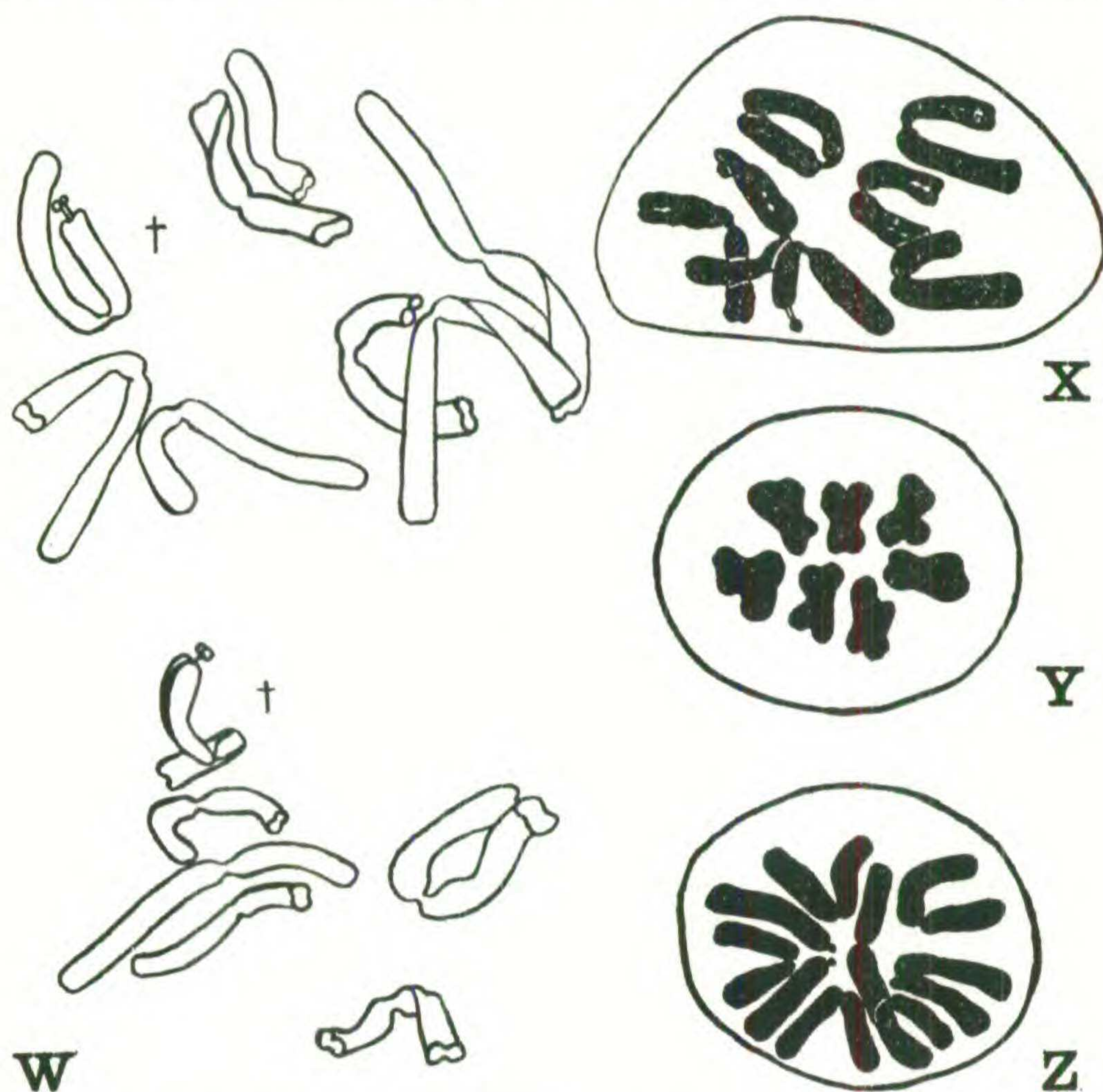
As might have been expected, its distinct morphological position in the genus *Allium* is reflected by its unusual chromosome number. The basic number for *Allium* is eight. Gaiser's summaries ('30, '30a) give twenty-seven species and varieties as having sixteen chromosomes ( $2n$ ), and four as having 32 ( $2n$ ). The only other number so far reported is seven, which was the haploid number reported for *A. ursinum* by Chodat ('25) and for *A. Moly* by Miyake ('05) and Levan ('29). The possible relationship of *Allium stellatum* to these species is uncertain, since *Allium* is a large genus badly in need of monographic treatment, and the natural relationships of the species have not been worked out.

Material was collected at Herculaneum, Missouri, and root-tips, pollen mother cells, and dividing pollen grains were examined. In the root-tips the large chromosomes nearly filled the cell at metaphase, and though there were many divisions it was difficult to find any which could be counted. Several counts were finally obtained and all gave fourteen chromosomes. The clearest is illustrated in fig. W. It will be noticed that there is one pair of chromosomes with satellites. Pollen divisions were much easier to count. All showed seven chromosomes and in many of them one chromosome was seen to bear a satellite (fig. X). All the pollen mother cells (fig. Y) showed a regular reduction division with seven pairs of conjugating chromosomes. The configurations were similar to those already published by Chodat ('25) and Levan ('29) for other species of *Allium*.

The genus *Nothoscordum* is closely related to the genus *Allium*, one of the chief differences being the lack of odor in the bulbs



and leaves of the former. Smears of young pollen grains were made from two plants of *Nothoscordum bivalve* (L.) Britton, collected at Cliff Cave, Missouri. Pollen grains of each plant were found to have nine (n) chromosomes (fig. Z), seven with median or sub-median constrictions, and two with terminal constrictions.



W, Somatic chromosomes ( $2n = 14$ ) from the root-tip of *Allium stellatum*. The figure has been separated for clearness and may be reassembled by superposing the + 's.

X, Dividing pollen grain of *A. stellatum*.  $\times 1900$ .

Y, Pollen mother cell of *A. stellatum*, polar view.  $\times 1900$ .

Z, Dividing pollen grain of *Nothoscordum bivalve*.  $\times 1800$ .

All figures drawn with camera-lucida at bench level and reduced one-half for illustration.

These latter are conspicuously marked by large, deep-staining insertion points. The chromosomes, like those of *Allium*, are large and ribbon-like. The attachment constrictions in *Allium* are usually median or sub-median (or at most sub-terminal). It



seems quite possible that *Nothoscordum* may have been derived from an eight-chromosomed parental stock by the division of one of the large median-constricted chromosomes. This is further borne out by the fact that the combined length of the two chromosomes with terminal constrictions is only a very little greater than that of the longest chromosome with a median constriction.

#### BIBLIOGRAPHY

- Chodat, R. ('25). La chiasmatype et la cinèse de maturation dans l'*Allium ursinum*. Soc. Bot. Genève, Bull. II. 17: 1-30. 1925.
- Gaiser, L. O. ('30). Chromosome numbers in Angiosperms. Bibl. Genet. 6: pp. 388-389. 1930.
- , (30a). *Ibid.* III. Genetica 12: p. 240. 1930.
- Levan, A. ('29). Zahl und Anordnung der Chromosomen in der Meiosis von *Allium*. Hereditas 13: 80-87. 1929.
- Miyake, K. ('05). Über Reduktionsteilung in der Pollenmutterzellen einiger Monokotylen. Jahrb. f. wiss. Bot. 42: 83-120. 1905.



## EXPLANATION OF PLATE

## PLATE 41

- Fig. 1. *Allium stellatum* on limestone outcrop, Festus, Missouri.  
Fig. 2. *Allium stellatum*, representative umbels.